

CRS Report for Congress

Received through the CRS Web

Missile Proliferation and the Strategic Balance in South Asia

October 17, 2003

Andrew Feickert
Analyst in National Defense
Foreign Affairs, Defense, and Trade Division

K. Alan Kronstadt
Analyst in Asian Affairs
Foreign Affairs, Defense, and Trade Division

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 17 OCT 2003		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Missile Proliferation and the Strategic Balance in South Asia				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Research Service The Library of Congress 101 Independence Avenue, SE Washington, DC 20540-7500				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 38	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Missile Proliferation and the Strategic Balance in South Asia

Summary

This report analyzes the policy implications of missile proliferation in South Asia, providing information on India's and Pakistan's missile programs and their role in regional security. The report also provides background on the India-Pakistan conflict and the U.S. role, and reviews the region's strategic security dynamics. The report concludes with a review of key issues and options for U.S. policy.

The United States has long been concerned about the proliferation of nuclear weapons and their delivery systems in South Asia. This concern became acute after May 1998, when both India and Pakistan tested nuclear explosive devices. Since that time, both countries have continued testing nuclear-capable ballistic missiles, and both have established command and control authorities to oversee their nuclear arsenals. India and Pakistan have fought three wars since 1947 and have significant unsettled territorial disputes. Although the status of weaponization is unclear, a slow-speed arms race appears to be underway on the Asian Subcontinent, and the proliferation of missile capabilities in South Asia has been identified as a potentially major threat to regional stability and to key U.S. foreign policy goals.

A persistent aspect of U.S. engagement in the region has been the difficulty of maintaining a balanced approach toward two antagonistic countries while simultaneously promoting perceived U.S. interests. During the 1990s, U.S. security policy toward South Asia focused on preventing weapons proliferation, but the Bush Administration shifted to a more "pragmatic" approach emphasizing "restraint" in this area. For perhaps the first period in history the United States currently enjoys simultaneously positive relations with both countries.

While relationships between the United States, India, and Pakistan have taken on a positive hue, potential for regional instability persists. The strategic capabilities of India and Pakistan could provide a ready catalyst for transforming disputes or terrorist incidents into potentially cataclysmic confrontations. Both countries also are pursuing the development or acquisition of missile defense systems. It is unknown at this early stage if missile defenses will offer a degree of stability to the region or if they will create an imbalance, thus prompting the other country to build more missiles to compensate for the disparity.

Key issues for Congress addressed in this report are the extent to which missile proliferation in South Asia enhances or upsets regional stability and the role of U.S. policy in promoting such stability, as well as in tension reduction and nonproliferation. Levels of U.S. foreign assistance to India and Pakistan, the establishment of aid restrictions, the transfer of conventional weapons platforms (possibly including missile defense systems), the setting of export control parameters and nonproliferation goals, and the maintenance of policy and intelligence oversight of U.S. relations with India and Pakistan constitute additional issues of concern to Congress. This report will be updated as warranted by events.

Contents

U.S. and Congressional Interest	1
Regional Conflict and the U.S. Role	4
Cold War	4
Post-Cold War	6
Post-9/11	6
Bilateral Security Dynamics	7
Debate Over a Regional Nuclear Weapons and Missile Race	7
Deterrence Models	8
Regional Strategic Force Capabilities	10
Indian Weapons and Delivery Systems	10
Pakistani Weapons and Delivery Systems	11
Missile-Related Stability Factors	12
Readiness Posture	12
Command and Control	13
Debate Over Regional Missile Defense	14
The Indian Approach to Missile Defense	15
The Pakistani Approach to Missile Defense	17
Key Issues and Options for Congress	17
Nonproliferation	17
MTCR-Related Issues	17
Technical Assistance	18
Export Controls	18
Confidence-Building Measures	19
Proliferation Security Initiative (Counterproliferation)	19
Other Issues	20
Pakistan-North Korea Relations	20
The BrahMos Cruise Missile	21
Vertical and Non-Missile Proliferation	21
Missile Defense	21
Terrorism	22
Regional Stability	22
Assessment	23
Appendix A. Missile Programs	25
India	25
Prithvi I	26
Prithvi II	27
Prithvi III	27
Agni I	27
Agni II	27
Agni III	27
Submarine Launched Ballistic Missiles (SLBMs)	28

Russian Involvement in India's Missile Program	28
BrahMos Cruise Missile	29
Pakistan	29
Hatf I	30
Hatf II	30
M-11	31
Shaheen I	31
Shaheen II	31
Ghauri I	31
Ghauri II	32
Foreign Involvement in Pakistan's Missile Program	32

List of Tables

Table 1. Indian Ballistic Missiles	26
Table 2. Pakistani Ballistic Missiles	30

List of Figures

Figure 1. Map of South Asia	34
-----------------------------------	----

Missile Proliferation and the Strategic Balance in South Asia

This report analyzes the policy implications of missile proliferation in South Asia, providing information on India's and Pakistan's missile programs and their role in regional security. The report provides background on the India-Pakistan conflict and the U.S. role, and reviews the region's security dynamics and strategic force capabilities, including each country's ballistic missile capability to deliver weapons of mass destruction (WMD). The report concludes with a review of key issues and options for U.S. policy.¹

U.S. and Congressional Interest

U.S. security interests in South Asia concentrate on weapons proliferation, strategies to reduce tensions, antiterrorism, and regional stability. This report emphasizes the role of missiles in South Asian security because of their potential use as delivery vehicles for nuclear weapons. As such, the proliferation of missiles in the region is considered to be a central variable in calculations gauging regional stability.

During the 1990s, the U.S. security focus in South Asia sought to minimize damage to the nonproliferation regime, prevent escalation of a nuclear arms and missile race, and promote Indo-Pakistani bilateral dialogue, especially on the sovereignty dispute over Kashmir. In light of these goals, the Clinton Administration established five "benchmarks" for India and Pakistan based on the contents of UN Security Council Res. 1172, which condemned the two countries' nuclear tests of May 1998. These were:

- signing and ratifying the Comprehensive Nuclear Test Ban Treaty (CTBT);²
- halting all further production of fissile material and participating in Fissile Material Cutoff Treaty (FMCT) negotiations;
- limiting development and deployment of WMD delivery vehicles;

¹ For broader discussion, see CRS Issue Brief IB93097, *India-U.S. Relations* and CRS Issue Brief IB94041, *Pakistan-U.S. Relations*, by Alan Kronstadt. For security-specific discussion, see CRS Report RL31644, *U.S.-India Security Relations*, by Amit Gupta; CRS Report RL31624, *Pakistan-U.S. Anti-Terrorism Cooperation*; CRS Report RL30623, *Nuclear Weapons and Ballistic Missile Proliferation in India and Pakistan*, by Alan Kronstadt; CRS Report RL31589, *Nuclear Threat Reduction Measures for India and Pakistan*; and CRS Report RS21237, *India and Pakistan Nuclear Weapons Status*, by Sharon Squassoni.

² For a review of the CTBT and its current status, see CRS Issue Brief IB92099, *Nuclear Weapons: Comprehensive Test Ban Treaty*, by Jonathan Medalia.

- implementing strict export controls on WMD materials and technologies; and
- establishing bilateral dialogue between New Delhi and Islamabad.

Progress in each of these areas has been limited, and the Bush Administration makes no reference to the benchmark framework.³ Neither India nor Pakistan has signed the CTBT, and both appear to be continuing their production of weapons-grade fissile materials.⁴ The status of weaponization and deployment is unclear, though there are indications that this is occurring at a slow, but more or less steady pace.⁵ Earlier optimism in the area of export controls waned as fears have gained credence that these countries, especially Pakistan, might seek to export WMD materials and/or technologies.⁶ Finally, while there has been no repeat of the intense 1999 military clashes in Kashmir — and a ten-month-long military standoff in 2002 ended without large-scale fighting — bilateral tensions remain significant, and no substantive dialogue between New Delhi and Islamabad is underway.

Upon taking office, the Bush Administration set out substantively to build upon an initial improvement in U.S. relations with New Delhi begun by President Clinton, while also shifting U.S. nonproliferation policy from seeking to prevent South Asian nuclearization to encouraging India and Pakistan to be “more responsible nuclear

³ Many analysts believe that the Bush Administration is less interested than previous administrations in normative-legal efforts at *nonproliferation* and is more concerned with pursuing active *counterproliferation* (Ejaz Haider, “Nonproliferation, Iran and Pakistan,” *Friday Times* (Lahore), September 19, 2003).

⁴ India has consistently rejected both the CTBT and the Nuclear Nonproliferation Treaty as discriminatory, calling instead for a global nuclear disarmament regime. While both India and Pakistan maintain self-imposed moratoria on nuclear testing, they refuse to sign the CTBT—a position arguably made more tenable by U.S. Senate’s rejection of the treaty in 1999.

⁵ Central Intelligence Agency, “Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 January-30 June, 2002,” April 2003, available at [http://www.odci.gov/cia/reports/721_reports/jan_jun2002.html].

⁶ Pakistan’s possible transfers of uranium enrichment materials and technologies to North Korea during the 1990s and perhaps as recently as July 2002 have sparked new concerns in U.S. policy-making circles (see CRS Report RL31900, *Weapons of Mass Destruction: Trade Between North Korea and Pakistan*, by Sharon Squassoni). In addition to possible proliferation activities involving North Korea, some reports indicate that Iran’s nuclear program has benefitted from Pakistani assistance. Moreover, there exist fears about the physical safety and security of Pakistan’s nuclear weapons themselves, along with concerns that Pakistani nuclear scientists have been in contact with Islamic militant groups, possibly including Al Qaeda. See “Testimony of Jon Wolfsthal Before the Subcommittee on Europe and the Subcommittee on International Terrorism, Nonproliferation, and Human Rights of the House International Relations Committee,” May 14, 2003; “The Evil Behind the Axis?,” *Los Angeles Times*, January 5, 2003; “Pakistan Tightens Security at Nuclear Facilities,” *Agence France-Presse*, January 22, 2003; Tim Burger and Tim McGirk, “Al Qaeda’s Nuclear Contact?,” *Time*, May 19, 2003.

powers.”⁷ Some analysts have argued that, by moving the U.S. focus away from international nonproliferation treaties such as the CTBT and withdrawing from the Anti-Ballistic Missile Treaty, the Bush Administration’s de-emphasis of “vertical proliferation”⁸ issues has contributed to legitimizing South Asia’s strategic arsenals.⁹ In the face of congressional questioning about seeming “contradictions” in U.S. policy, Assistant Secretary of State for South Asia Christina Rocca stated in March 2003 that the United States is taking a “pragmatic approach” that seeks to have India and Pakistan “exercise restraint” with regard to the proliferation of strategic arsenals.¹⁰

The September 2001 terrorist attacks on the United States and ensuing U.S.-led antiterrorism efforts transformed U.S. relations with India and, especially Pakistan, which again became a “front-line” ally and beneficiary of significant U.S. foreign assistance (up from \$3.5 million in FY2001 to more than \$1 billion in FY2002). India’s swift offer of full support for U.S. antiterrorism efforts was widely viewed as reflective of much improved U.S.-India relations. In 2003, and for perhaps the first period in history, the United States simultaneously enjoys positive relations with both countries.¹¹ This circumstance may mean that the ability of the United States to influence South Asian security dynamics is at an all-time high. At the same time, differences with Pakistan (over issues of terrorism, proliferation, and democratization) and with India (over definitions of terrorism, U.S. policy in the Middle East, and human rights) continue to cloud forecasts of future U.S. engagement with South Asia’s two largest and nuclear-armed countries.

The key issues for Congress addressed here are whether missile proliferation in South Asia enhances or detracts from regional stability and the role of U.S. policy in promoting such stability, as well as in tension reduction and nonproliferation. Levels of U.S. foreign assistance to India and Pakistan, the establishment of aid restrictions, the transfer of conventional weapons platforms (possibly including missile defense systems), the setting of export control parameters and nonproliferation goals, and the maintenance of policy and intelligence oversight of U.S. relations with India and

⁷ Stephen P. Cohen, “South Asia,” in *Strategic Asia 2002-03: Asian Aftershocks*, Richard Ellings and Aaron Friedberg, eds. (Seattle: National Bureau of Asian Research), 2002. President Bush’s 2002 U.S. National Security Strategy asserts that “U.S. interests require a strong relationship with India” (available at [<http://www.state.gov/r/pa/ei/wh/c7889.htm>]).

⁸ “Vertical proliferation” refers to the progressive development of WMD within states, while “onward proliferation” refers to the transfer of WMD or WMD technologies between states.

⁹ See, for example, C. Raja Mohan, “India, the U.S. and Nonproliferation,” *Hindu* (Madras), September 25, 2003; Khaled Ahmed, “The Cost of Opposing General Musharraf,” *Friday Times* (Lahore), July 18, 2003; Sumit Ganguly, “The Start of a Beautiful Friendship?: The United States and India,” *World Policy Journal*, Spring 2003.

¹⁰ “Transcript: Hearing of the Subcommittee on Asia and the Pacific of the House International Relations Committee,” Federal News Service, March 20, 2003

¹¹ In July 2003, Secretary of State Powell offered that “we probably have the best relations we have had with India and Pakistan now than in many, many years” (“Interview With The Washington Times Editorial Board,” Department of State Press Release, July 22, 2003).

Pakistan all have a vital congressional facet. Pending and future legislation could influence levels of stability in South Asia.

Regional Conflict and the U.S. Role

Understanding present-day missile proliferation in South Asia and relevant U.S. policy options is aided by a review of the historical setting. Three wars — in 1947-48, 1965, and 1971 — and a constant state of military preparedness on both sides of their shared border have marked the half-century of bitter rivalry between India and Pakistan. A bloody battle in the Kashmiri mountains near Kargil in 1999 cost thousands of lives and marked history's first significant direct clash between the forces of two nuclear-armed countries. Most recently, a 10-month-long military standoff in 2002 involving up to one million Indian and Pakistani soldiers was viewed as the closest the two countries had been to full-scale war since 1971, and caused the U.S. government to become "deeply concerned ... that a conventional war ... could escalate into a nuclear confrontation."¹²

A persistent and oftentimes perplexing aspect of U.S. engagement in the region has been the difficulty of maintaining a more-or-less balanced approach toward two antagonistic countries while simultaneously promoting perceived U.S. interests in South Asia. India has seven times the population and four times the land area of Pakistan. In 2002, the Indian GDP was more than eight times that of Pakistan, and the Indian military enjoys a 2:1 or 3:1 advantage in numbers of soldiers and conventional arms.¹³ Yet, despite India's clearly greater status in these concrete terms, the United States has for the past half-century found itself much more closely engaged with Pakistan, in particular during the 1950s, when Pakistan was part of the U.S.-led alliance system to contain the Soviet Union; the 1980s, when Pakistan was a front-line ally in U.S.-supported efforts to defeat the Soviet Army in Afghanistan; and today, when Pakistan is again a front-line ally, this time in U.S.-led efforts to defeat Islamic militancy.

Cold War¹⁴

India and Pakistan were established in August 1947 from what had been British India. Some 500,000 people died during the Partition, and by October the two countries were fighting a war over the disputed Kashmir region. Even before the onset of the U.S.-Soviet Cold War, there existed a "strategic divergence" between the

¹² Statement of George Tenet Before the Senate Armed Services Committee, "Worldwide Threat: Converging Dangers in a Post-9/11 World," March 19, 2002.

¹³ CIA World Factbook, available at [<http://www.odci.gov/cia/publications/factbook/index.html>].

¹⁴ Much of the general historical information in these sections is derived from Stephen P. Cohen, *India: Emerging Power* (Washington: Brookings Institution Press), 2001; Dennis Kux, *India and the United States: Estranged Democracies* (Washington: National Defense University Press), 1992; and Dennis Kux, *The United States and Pakistan 1947-2000: Disenchanted Allies* (Washington: Woodrow Wilson Center Press), 2001.

United States and Indian nationalists that “set habits and patterns on both sides” which persisted for many decades.¹⁵ Over the course of the Cold War, U.S. interest in South Asia was inconsistent and almost wholly subordinated to efforts at containing Soviet and Chinese communist expansion. A perceived absence of compelling geostrategic or economic stakes limited the extent of U.S. involvement in South Asian affairs.

During the 1950s, Pakistan became embedded in U.S.-led treaty organizations that sought to encircle and contain communist expansion. Two key results were the institutionalization of close U.S.-Pakistan ties and the provision to Islamabad of large assistance packages.¹⁶ While this U.S.-Pakistan security relationship developed, Indian leaders concentrated on nation-building and followed a policy of what became known as nonalignment. By the mid-1950s, Washington’s differences with New Delhi gave rise to what a top U.S. diplomat characterized as “correct but rather chilly” exchanges that would last for several decades.¹⁷

After a brief 1962 border war with China exposed serious weaknesses in the Indian Army, the United States initiated military assistance programs for New Delhi that totaled about \$150 million by 1966. However, the second India-Pakistan war over Kashmir in 1965 spurred the United States to end military assistance to both countries. Given Pakistan’s 10 years of close cooperation with the United States, some in Islamabad felt betrayed by this move. However, when East Pakistan (now Bangladesh) fell into turmoil in 1971, leading to the forced partition of Pakistan after its defeat in a third war with India, President Nixon elected to “tilt” U.S. support toward Pakistan and, in so doing, brought U.S.-India relations to a nadir.¹⁸ India’s “peaceful nuclear explosion” of 1974 made South Asian weapons proliferation a top-tier U.S. concern for the remainder of the Cold War. The Soviet invasion of Afghanistan of 1979 transformed U.S.-Pakistan relations virtually overnight, and during the 1980s Pakistan became regarded as a front-line U.S. ally in the struggle against Soviet expansion.¹⁹

¹⁵ Stephen P. Cohen, “The United States, India, and Pakistan: Retrospect and Prospect,” in *India and Pakistan*, Selig Harrison, Paul Kreisberg, and Dennis Kux, eds. (Washington: Woodrow Wilson Center Press), 1999. One senior observer offers that, “In contrast with the relatively stable, if estranged relationship with India, American interaction with Pakistan has been intense and extraordinarily volatile,” because of fluctuating and often divergent interests (Dennis Kux, *The United States and Pakistan*, p. xviii).

¹⁶ Islamabad received nearly \$12 billion in U.S. aid from 1947-1997, about one-quarter in the form of military assistance. New Delhi received more than \$13 billion in U.S. aid during this period, but only 1% was military assistance (U.S. Agency for International Development “Greenbook” at [<http://quesdb.cdie.org/gbk/index.html>]).

¹⁷ Deputy Secretary [of State] Strobe Talbott, “U.S. Diplomacy in South Asia: A Progress Report,” *U.S. Department of State Dispatch*, December 16, 1998.

¹⁸ The United States sailed the *Enterprise* carrier task force into the Bay of Bengal in 1971 to deter an Indian attack on West Pakistan, an event that had lasting effect on New Delhi’s security perspectives.

¹⁹ The military regime of Pakistani Gen. Zia-ul Haq subsequently received several billion dollars in U.S. economic and military aid, even as President Reagan continued the (continued...)

Post-Cold War

Following the Soviet Union's withdrawal from Afghanistan and its subsequent collapse in 1991, U.S. policy toward South Asia sought to "break the zero-sum mindset that [had] plagued Indo-Pakistani relations since partition and was reinforced by the global rivalries of the past decades."²⁰ Proliferation-related restrictions on aid to Pakistan constrained this effort, however, and contributed to a perceived imbalance in U.S. policy after their (re-)imposition in 1990.²¹ For India, the end of the Cold War meant an end to two decades of close Indian-Soviet relations and a major reduction of aid infusions from Moscow. At about the same time, disaffected separatists in the Jammu and Kashmir state launched a full-blown rebellion there. During the 1990s, Islamabad came under intense criticism from both India and the United States for its active role in supporting the insurgency, and later for its support of the Afghani Taliban regime. The May 1998 nuclear tests triggered sweeping U.S. aid restrictions on both countries, and an October 1999 military coup in Pakistan brought added U.S. sanctions on that country.²² Yet the decade-long shift in U.S. orientation toward South Asia became especially clear when President Clinton visited the region in March 2000, spending six days in India, but only six hours in Pakistan.

Post-9/11

The September 2001 terrorist attacks on the United States suddenly transformed U.S. relations with Pakistan, which again became a front-line U.S. ally, this time against radical Islamic terrorists and their supporters. India also joined the U.S.-led antiterrorism coalition, and remaining aid restrictions on both India and Pakistan were quickly lifted by Congress and President Bush. However, while the Bush Administration has moved to bolster U.S.-India relations on a broad front — including regular and unprecedented joint military exercises and potentially major arms sales to New Delhi — the U.S.-Pakistan relationship has continued to be constrained by U.S. concerns regarding Islamabad's possible role in WMD proliferation, terrorist infiltration into both Indian Kashmir and across the Durand Line separating Pakistan and Afghanistan, and perceived anti-democratic practices by President Gen. Pervez Musharraf. Despite these concerns, Islamabad again became a leading recipient of U.S. foreign assistance funds.

¹⁹ (...continued)

betterment of U.S.-India relations begun by President Carter.

²⁰ [Assistant Secretary of State for South Asia] Robin Raphel, "South Asia After the Cold War: India and Pakistan," *U.S. Department of State Dispatch*, September 25, 1995.

²¹ Sec. 620E(e) of the Foreign Assistance Act (the Pressler Amendment of 1985) requires the President to determine that Pakistan does not possess a nuclear explosive device and that any proposed U.S. assistance would reduce the risk of obtaining such a device. In 1990, then-President Bush did not make the finding required to make assistance available.

²² See CRS Report RS20995, *India and Pakistan: U.S. Economic Sanctions*, by Dianne Rennack.

Bilateral Security Dynamics

Debate Over a Regional Nuclear Weapons and Missile Race

Central to an analysis of the meaning of missile proliferation in South Asia are two key questions: First, is a strategic arms race between India and Pakistan underway? And, second, does progress in the development of missile and nuclear capabilities promote or degrade regional stability? Indian and Pakistani government officials express a desire to avoid engaging in a costly and potentially disastrous arms race, while also asserting that no such race is afoot.²³ Yet a 2001 Defense Department review of proliferation threats indicated that, “Indian and Pakistani strategic programs continue to be driven by the perception of the other’s effort,” and that the two countries “are in a period of accelerated nuclear weapons and missile development” that may be termed a “slow-speed” arms race.²⁴ In 2002, Director of Central Intelligence Tenet told the Senate Select Committee on Intelligence that,

Both India and Pakistan are working on the doctrine and tactics for more advanced nuclear weapons, producing fissile material, and increasing their nuclear stockpiles. ... Both countries also continue development of long-range nuclear-capable ballistic missiles, and plan to field cruise missiles with a land-attack capability.²⁵

Apparent tit-for-tat ballistic missile tests in April 1999 and again in March 2003 have been viewed as evidence that an action-reaction dynamic is indeed at work.²⁶ Many analysts argue that overt nuclear weaponization by either side — most especially of their ballistic missiles — could be highly destabilizing, especially if significant nuclear missile forces are deployed in the absence of secure command and control structures. If these forces are perceived as being vulnerable to attack, one or both sides might adopt a launch-on-warning status, making conflict escalation even more difficult to govern.²⁷

Ever since the 1998 nuclear tests in South Asia, it has appeared that India’s strategic decision-making is a key factor in shaping regional stability. According to the Pentagon, “India’s development of [medium-range ballistic missiles (MRBMs)] ... is motivated by its desire to be recognized as a great power and strategic

²³ “Musharraf Says No Arms Race On Subcontinent,” Associated Press Newswire, September 4, 2003; “India Not In Arms Race: PM,” *Hindustan Times* (Delhi), October 13, 2003.

²⁴ U.S. Department of Defense, *Proliferation: Threat and Response*, 2001.

²⁵ Statement of George Tenet Before the Senate Select Committee on Intelligence, “Worldwide Threats to National Security,” February 6, 2002.

²⁶ Michael Mecham, “India Test Fires Agni Missile; Pakistan Responds With Ghauri,” *Aviation Week and Space Technology*, April 19, 1999; Edward Luce, “India and Pakistan Launch Test Missiles,” *Financial Times* (London), March 27, 2003.

²⁷ Neil Joeck, *Maintaining Nuclear Stability in South Asia* (New York: Oxford University Press, 1997).

competitor with China.”²⁸ China seems content with its existing deterrent against India, and Pakistan’s limited resources appear to constrain its ability to initiate an Indo-Pakistani arms race.²⁹ Thus, a key variable in the future evolution of South Asian nuclear proliferation is India’s strategic intention in relation to China. One of the more dangerous scenarios is one in which India actively seeks to gain nuclear parity with China by building a larger nuclear arsenal and long-range delivery force. In the middle-term, the deployment of Agni missiles capable of striking China’s eastern population centers could spur Beijing to re-target more nuclear forces to the south and likewise move Islamabad to seek some form of parity in this arena, thus potentially setting in motion a full-blown arms race on the Asian Subcontinent.³⁰ Moreover, some observers suggest that U.S. sales of theater missile defense systems in Asia — or the deployment of a national system covering U.S. territory — could spur further ballistic missile proliferation in South Asia (see below).³¹

Deterrence Models

Debate over the proliferation of strategic arsenals generally is divided into two camps: “optimists” and “pessimists.”³² *Proliferation optimists* operate under the logic of deterrence, wherein the possession of nuclear weapons by both sides of an adversarial interstate relationship can be expected to produce stability. Put simply, mutual deterrence obtains when both sides believe that the costs of aggression or escalation are likely to outweigh the potential benefits of such action.³³ *Proliferation pessimists*, however, take the view that the spread of nuclear weapons capability is inherently destabilizing and dangerous, and that nuclear dynamics in the developing world are unlikely to re-create the Cold War pattern. Political and technological factors in conflict-prone areas are seen to create conditions where nuclear weapons will not produce stability and the introduction of more nuclear weapons will significantly increase the likelihood that these weapons will be used.³⁴ Many analysts have pointed to the brief, bloody Kargil conflict of 1999 as evidence that South Asia’s strategic arsenals do not contribute to stability and may lead to the use of nuclear weapons.³⁵

²⁸ U.S. Department of Defense, *Proliferation: Threat and Response*, 1997.

²⁹ Ben Sheppard, “South Asia Nears Nuclear Boiling Point,” *Jane’s Intelligence Review*, April 1999.

³⁰ Joseph Cirincione, “The Asian Nuclear Reaction Chain,” *Foreign Policy*, Spring 2000.

³¹ Michael Krepon, “Missile Defense and the Asian Cascade,” in *The Impact of US Ballistic Missile Defenses on Southern Asia*, Michael Krepon and Chris Gagne, eds., Henry L. Stimson Center Report No. 46, Washington, D.C., July 2002.

³² For an overview of this debate, see Scott Sagan and Kenneth Waltz, *The Spread of Nuclear Weapons: A Debate* (New York: WW Norton & Co), 1995.

³³ For an example of this logic applied to South Asia, see Devin Hagerty, *The Consequences of Nuclear Proliferation: Lessons from South Asia* (Cambridge: MIT Press), 1998.

³⁴ See, for example, Scott Sagan, “The Perils of Proliferation in South Asia,” in Michael Chambers, ed., *South Asia in 2020* (Carlisle, PA: Army War College).

³⁵ At least two credible reports indicate that India and Pakistan came perilously close to a
(continued...)

Only seven months after the May 1998 tests, the main architect of the “benchmark” framework, then-Deputy Secretary of State Strobe Talbott, noted that the New Delhi and Islamabad governments were justifying their moves to overt capabilities with reference to the U.S.-Soviet experience, “almost as if they see Cold War brinkmanship between the superpowers as something to be emulated.” He warned that such a perspective misreads the reality of U.S.-Soviet interactions, and that historic, geographic, and economic differences appear significant in the South Asian case.³⁶ This use of the Cold War experience illustrates the general proliferation optimism of the Indian and Pakistani governments in contrast with the proliferation pessimism expressed by some U.S. government officials, especially those in the State Department. As noted above, Bush Administration officials have been more muted in their criticism of South Asian strategic arsenals.

Both India and Pakistan have claimed to be seeking only the nuclear weapons needed for *minimum credible deterrence* (MCD).³⁷ Most Indian and Pakistani planners have conceived of MCD as a significantly scaled-down form of the massive urban/industrial retaliation envisaged under the U.S. nuclear doctrine of the 1950s, based on the ability to launch a retaliatory strike that would inflict “unacceptable damage” upon an adversary.³⁸ Given the expressed positions of the Indian and Pakistani governments and their observable behaviors as noted in the sections above, it would appear that some form of strategic arms race is taking place on the Asian Subcontinent, albeit one in which progress is limited by economic and technological factors. There exists no consensus, however, on the question of how such

³⁵ (...continued)

nuclear exchange in June 1999 (Bruce Reidel, “American Diplomacy and the 1999 Kargil Summit at Blair House,” Center for the Advanced Study of India, University of Pennsylvania, May 2002; Sanjay Badri-Maharaj, “Nuclear India’s Status: Examination of Claims in the NBC Report,” *Indian Defence Review* (Delhi), Spring 2000).

³⁶ Deputy Secretary [of State] Strobe Talbott, “U.S. Diplomacy in South Asia: A Progress Report,” *U.S. Department of State Dispatch*, December 16, 1998.

³⁷ “Address by the Prime Minister at Founder’s Day Function of Bhabha Atomic Research Center, October 31, 2002,” Indian Embassy, Washington, D.C., available at [<http://meaindia.nic.in/speech/2002/10/31spc01.htm>]; “Pakistan Not Involved In Any Arms Race: President, Premier,” Pakistan Press International, August 17, 2003. There is debate over the number of weapons needed for MCD. Estimates that provide a range cite from as few as 20 to as many as 400 warheads on each side (see, for example, Amit Gupta, “After the Bomb: U.S. Policy Toward a Nuclear South Asia,” *Mediterranean Quarterly* 10, 2, Spring 1999, for a lower estimate, and D. Ramana, “What Next? Way to a Credible Deterrent,” *Rakshak Monitor* 2, 3 (Bombay), November 1999, for a higher estimate). The New Delhi government has expressed a belief that an effective MCD will require a triad of delivery systems (land, sea, and air) (“Draft Report of the National Security Advisory Board on Indian Nuclear Doctrine, Aug. 17, 1999,” Indian Embassy, Washington, D.C., available at [<http://meaindia.nic.in/disarmament/dm17aug99.htm>]).

³⁸ Gregory Giles and James Doyle, “Indian and Pakistani Views on Nuclear Deterrence,” *Comparative Strategy* 15, 1996. Many analysts believe that Pakistan’s assumed conventional disadvantage causes its strategists to both reject a no-first-use pledge and to consider the use of tactical nuclear weapons to repulse a hypothetical Indian armored thrust, perhaps even by detonating such weapons over Pakistani territory (Saeed Ismat, “A Conceptual Nuclear Doctrine,” *Defence Journal* (Karachi), March 2000).

developments affect the level of regional stability. One's perspective on this issue tends to be decisively colored by fundamental beliefs about the utility of nuclear deterrence and the extent to which it obtains in South Asia. Such beliefs often are derived through analysis of key variables that affect stability in the region: Indian and Pakistani strategic capabilities and control mechanisms, and their potential deployment of missile defense systems.

Regional Strategic Force Capabilities

India and Pakistan have the ability to strike and destroy military and civilian targets outside of their respective countries by means of nuclear weapons, ballistic missiles, and aircraft. These forces, associated readiness postures, command and control, and missile defense constitute a strategic capability on a regional scale. This section will discuss these capabilities and their impact on regional security. Detailed descriptions of the specific missiles in India's and Pakistan's arsenals are presented in the Appendix.

Indian Weapons and Delivery Systems

In June of 1998, as required by the Chemical Weapons Convention (CWC), India declared that it possessed chemical weapons; it is now reportedly in the process of destroying its chemical weapons stockpile. India, a 1973 signatory of the Biological Weapons Convention (BWC), is believed to have an active biological defense research program as well as the necessary infrastructure to develop a variety of biological agents.³⁹

Estimates on India's nuclear weapons arsenal vary but a number of analysts believe that, as of 2002, India had between 30 to 35 nuclear weapons with yields varying between 5 to 25 kilotons (Kts) (despite an Indian claim that it had detonated a nuclear device on May 11, 2002 with a 43 KT yield).⁴⁰ These devices are likely configured as aerial bombs or missile warheads. While a precise breakdown of number of bombs versus missile warheads is unknown, a senior Pakistani military official reportedly claimed that the majority of India's nuclear weapons were configured as aerial bombs.⁴¹

While India reportedly has a number of different types of aircraft, some analysts believe that it would use 1970s- and 1980s-vintage Soviet-built MiG-27 Flogger aircraft, with a range of 800 km, and the Anglo-French Jaguar aircraft with a 1,600

³⁹ "Chemical and Biological Weapons at a Glance," *Arms Control Association Fact Sheet*, Washington, D.C., September 2002.

⁴⁰ "India's Nuclear Forces" - 2002, *Bulletin of the Atomic Scientists*, Volume 58, March 2002, p. 1.

⁴¹ "The Consequences of Nuclear Conflict Between India and Pakistan," *Natural Resources Defense Council*, June 4, 2002.

km range to deliver nuclear aerial bombs.⁴² The Sukhoi-30MKI aircraft purchased from Russia with a reported capacity to carry an 8,000 kg payload, and with a normal range of 3,200 km and an air-to-air refueling range of about 7,000 km, gives India a nuclear deep strike capability and some experts believe that India acquired the Sukhoi to counter China's deep-strike capability.⁴³

India is suspected of having successfully flight tested an Agni II missile (range 3,000 - 3,500 km) carrying a nuclear warhead assembly without its plutonium core in 1999 and again in 2001.⁴⁴ While such tests are considered crucial for warhead development by some experts, some nuclear scientists believe that additional flight testing to adequately test the weapon's fuze and trigger will be required before India could deploy nuclear-armed missiles operationally.⁴⁵ According to press reports, India's Defense Minister, George Fernandez, reported to the Indian Parliament on July 29, 2003 that India had conducted 20 tests of seven different types of missiles, including two Agni variants, during the first half of 2003.⁴⁶

While not a weapon or delivery system, India's satellites contribute to its strategic capabilities. Some analysts believe that India's network of communication satellites and its Technology Experiment Satellite, which reportedly has an optical resolution capacity of one meter, provides India with a strategic early warning capability that could help ensure the survivability of its nuclear forces. These satellites could also help improve India's military command, control, communication, and intelligence capacities.⁴⁷

Pakistani Weapons and Delivery Systems

Pakistan, a member of the CWC since 1997, is not believed to possess chemical weapons but, according to a January 2001 U.S. Department of Defense (DOD) report, has imported a number of dual-use chemicals with commercial applications that could also be used to make chemical weapons. Pakistan, a BWC member since 1974, was assessed by the DOD in 2001 as having the resources and scientific capability to conduct limited biological warfare research and development, but was not believed to possess biological weapons.⁴⁸

⁴² India's Nuclear Forces - 2002, p. 2.

⁴³ Srinjoy Chowdhury, "Sukhois Capable of Hitting Chinese Targets," *Statesman* (London), September 28, 2002.

⁴⁴ *Ibid.*, p. 3.

⁴⁵ "India's Slow-Motion Nuclear Deployment," *Carnegie Endowment for International Peace Non-Proliferation Project*, Washington D.C., September 7, 2000, p. 1.

⁴⁶ "Twenty Missile Tests in India in the First Half of 2003 at a cost of 16 Million Dollars," *Agence France Presse*, July 30, 2003.

⁴⁷ "Upendra Choudhury, India's Space Assets and the Security Applications," *Hindu* (Madras), November 15, 2002.

⁴⁸ "Proliferation: Threat and Response," *Office of the Secretary of Defense*, January 2001, p. 28.

Information on Pakistan's nuclear weapons arsenal is speculative but some analysts believe that Pakistan possesses between 24 and 48 nuclear weapons configured as both aerial bombs and missile warheads. Despite Pakistani claims of higher yield weapons, seismic measurements from Pakistani nuclear detonations on May 28 and 30, 2002 suggest weaponized yields more along the order of 9-12 KT and 4-6 KT, respectively.⁴⁹ It is possible that Pakistan has higher yield weapons that have not been tested.

While Pakistan has obtained a variety of combat aircraft from different nations, many experts believe that the most likely aircraft to be used to deliver nuclear weapons would be the U.S. F-16 fighter. Twenty eight F-16 A (single seat) and 12 F-16 B (two seat) fighters were delivered to Pakistan between 1983 and 1987, and 8 of these original aircraft are believed to be no longer in service. Pakistan's 1988 order of 11 additional F-16 A/Bs and additional orders for F-16s since then have not been fulfilled due to the 1985 congressional enactment of the Pressler Amendment (Section 620E of the Foreign Assistance Act of 1961 as amended) which forbids military aid to suspected nuclear weapons states.⁵⁰ Despite the September 22, 2001 Presidential Determination waiving the Pressler Amendment and other sanctions on India and Pakistan, the Administration's current five- year, \$ 3 billion aid package will reportedly not include the promised F-16s, despite President Musharraf's request that their sale be approved.⁵¹ Pakistan's current fleet of F-16s is believed to be capable of delivering a 1,000 kg nuclear bomb to a range of 1,600 km.⁵²

While some analysts believe that Pakistan's Hatf, M-11, and Shaheen short and medium range missiles are nuclear-capable, Pakistan's A.Q. Khan, director of the organization that builds the Ghauri missile, reportedly claims that the Ghauri is currently Pakistan's only nuclear-capable missile.⁵³ In May of 1998, the Pakistani government claimed that it was ready to equip the Ghauri with nuclear weapons.⁵⁴

Missile-Related Stability Factors

A number of factors influences the stability of India's and Pakistan's missile forces. These factors include:

Readiness Posture. India's and Pakistan's deployment of missiles and nuclear-capable aircraft as well as nuclear warheads and bombs has been described

⁴⁹ "Table of Pakistani Nuclear Forces" - 2002, *Natural Resources Defense Council*, November 25, 2002.

⁵⁰ Table of Pakistani Nuclear Forces - 2002, p. 2.

⁵¹ Mike Allen, "U.S. Will Increase Aid to Pakistan," *Washington Post*, June 25, 2003. Of note, the U.S. government repaid Pakistan in 1998 for the undelivered F-16 aircraft.

⁵² Table of Pakistani Nuclear Forces - 2002, p. 2.

⁵³ *Ibid.*

⁵⁴ Anthony Cordesman, "Weapons of Mass Destruction in the Middle East," *Center for Strategic and International Studies*, Washington D.C., June 2002, p. 103.

by some analysts as a “virtual state of de-alert.”⁵⁵ Regional analysts assert that both India and Pakistan maintain similar readiness postures. Each country claims that its missiles are not truly deployed but, on a day-to-day basis, are maintained in what is described as a state of “induction.” Induction is described as the peacetime, non-threatening activity of acquiring a weapon and testing and training with it. Deployment is described as a belligerent posture with missiles actually on launchers, deployed to forward locations, and kept in a high state of readiness for use.⁵⁶ Both countries have been accused of having deployed their missiles on a number of occasions. During the July 1999 Kargil crisis, U.S. intelligence reportedly detected the Pakistani military deploying nuclear-armed missiles, a fact reportedly unknown to Pakistani Prime Minister Nawaz Sharif who was in Washington D.C. on July 4th conferring with President Clinton in an attempt to de-escalate the Kargil situation.⁵⁷

Both countries’ nuclear weapons are believed to be stored in facilities separate from airfields and missile units for both security and maintenance purposes. One observer suggested that in order for India and Pakistan to have more credible nuclear postures, both countries should increase the state of alert of their nuclear forces to at least provide a rudimentary capability to launch under attack. He posited that such a posture could be particularly of use to India in terms of China, which is believed to keep a portion of its ballistic missile force on a high state of alert.⁵⁸ Many analysts, however, believe that the current state of alert in India and Pakistan is a credible deterrence posture and that any move by either country to increase its posture could have negative consequences.

Command and Control. Unlike India, which has declared a “no-first-use policy” for its nuclear weapons, Pakistan has not issued a similar statement. In February 2000, Pakistan announced the creation of a National Command Authority (NCA) comprised of an Employment Control Committee, Development Control Committee, and a Strategic Plans Division.⁵⁹ Pakistan’s President, General Musharraf, serves as leader of the NCA and likely would exercise ultimate authority over employment of nuclear weapons. Pakistan’s NCA membership reportedly includes officials from “foreign affairs, defense and interior ministers, chiefs of all military services and heads of strategic organizations.” General Musharraf also reportedly established a Strategic Force Command that is responsible for the

⁵⁵ Waheguru Pal Singh Sidhu, “Regional Perspectives: South Asia,” *International Perspectives on Missile Proliferation and Defense*, Center for Nonproliferation Studies and the Mountbatten Centre for International Studies, London, March 2001, p. 67.

⁵⁶ *Ibid.*, p. 68, for discussion on readiness postures.

⁵⁷ Bruce Riedel, “American Diplomacy and the 1999 Kargil Summit at the Blair House,” Policy Paper Series - Center for the Advanced Study of India, University of Pennsylvania, 2002, p. 11.

⁵⁸ Sidhu, p. 68.

⁵⁹ Gaurav Kampani, “Safety Concerns About the Command and Control of Pakistan’s Strategic Forces, Fissile Material, and Nuclear Installations,” Monterey Institute of International Studies, September 28, 2001, p. 1.

deployment of strategic missiles.⁶⁰ While some experts consider the establishment of a political-military command and control hierarchy reassuring, others point out that in order for it to be effective there must be clear and undisputed lines of authority and established and practiced procedures.

On January 4, 2003, the Indian government announced the establishment of its Nuclear Command Authority. Reportedly, the Nuclear Command Authority consists of a two-tiered political council headed by the Prime Minister who will be the singular authority for launching a nuclear attack and an executive council chaired by the Prime Minister's national security advisor who will provide input for decision making purposes and execute directives from the political council.⁶¹ As part of the establishment of the Nuclear Command Authority, the Indian government also established a strategic forces command which, according to press reports, would command all strategic assets defined as "aircraft, land-based missiles, and nuclear weapons and bombs."⁶² While the Indian government claimed that the establishment of the Nuclear Command Authority and the strategic forces command were logical command and control arrangements, some officials conceded that the creation of these two entities was also a response to international concerns about India's "rudimentary, almost non-existent nuclear command and control structure and also to send a 'firm' message to Pakistan."⁶³

Debate Over Regional Missile Defense

Regional missile defense has been viewed by some analysts as a potential catalyst to promote stability and by others as an inherently volatile proposition which could upset the region's strategic balance. In July 2002, a Deputy Assistant Secretary for Defense presented DOD's position on regional missile defense to the Senate Governmental Affairs Committee: "We believe that missile defenses, generally speaking, are part of an inherently stabilizing concept. The right to defend yourself against these missiles is something we feel is a matter to explore with the Indians, with the Pakistanis if they're interested."⁶⁴

This Pentagon position reportedly is not shared by the State Department. During the same Senate Governmental Affairs Committee hearing, State Department

⁶⁰ "Pakistan Improves Nuclear Command and Control System," *Stratfor.com*, December 7, 2000, p. 2, available at [<http://www.hvk.org/articles/1200/37.html>].

⁶¹ Rahul Bedi, "India Establishes Nuclear Command Authority," *Jane's Defense Weekly*, January 15, 2003, p. 12.

⁶² "India Forging Special Unit to Operate Nuclear Arsenal," *News* (Karachi), October 1, 2002.

⁶³ Bedi, p. 12.

⁶⁴ David Ruppe, "India: Washington Considers Allowing Transfer of the Arrow Interceptor," *Global Security Newswire*, July 30, 2003.

officials expressed concern that if India obtained the joint U.S. - Israeli Arrow ballistic missile interceptor, that it might heighten tensions with Pakistan.⁶⁵

The Indian Approach to Missile Defense

Some experts believe that India's motivation for a missile defense capability was a result of Pakistan's acquisition of M-11 short-range ballistic missiles from China in 1992 and its continued development of longer range and more capable missiles.⁶⁶ Other analysts note that India's desire for missile defense is also a function of its concern about the Chinese DF-21 medium-range ballistic missiles believed to be deployed in western China. Pakistan's periodic declarations that it would use nuclear weapons against India if it feels threatened likely reinforced New Delhi's desire to obtain a ballistic missile defense capability.

India is reported to be pursuing two approaches to regional missile defense: creating an indigenous system or purchasing a complete system from another country. Since late 1993, India's Defense Research and Development Organization (DRDO) has reportedly been involved in efforts to modify the Indian-designed Akash low-to-medium altitude surface-to-air missile (SAM) into an interceptor capable of engaging ballistic missiles.⁶⁷ While some analysts report that efforts are still underway to develop the Akash into a missile defense system, there have been no open-source reports of the Akash being tested against ballistic missile targets.

A number of reports suggest that India also is interested in purchasing the jointly-developed U.S. - Israeli Arrow Missile Defense system from Israel. Because the United States has played a major financial and scientific role in developing the Arrow, any legal export of the system by Israel would likely require prior U.S. approval. Both the Senate and House Armed Services Committees have expressed reservations about a possible sale to India or other countries (Turkey has also expressed an interest in the Arrow) and reportedly have the following concerns:

- Although the Arrow is a defensive system, it could possibly be re-engineered into an offensive system;
- Its sale could possibly trigger a regional offensive arms race;
- Israel has allegedly transferred or attempted to transfer critical military technologies to countries of concern such as China;
- Such a sale could violate the provisions of the Missile Technology Control Regime (MTCR), a missile nonproliferation arrangement to which the United States is a party; and,

⁶⁵ *Ibid.*

⁶⁶ See CRS Report RL31555, *China and Proliferation of Weapons of Mass Destruction and Missiles: Policy Issues*, by Shirley A. Kan

⁶⁷ *Ibid.*

- Concern that Israel would profit from the sale of a product largely paid for by the United States and might also constitute competition to Raytheon's U.S. Patriot missile system.⁶⁸

The Arrow 2 missile system is designed to provide terminal phase⁶⁹ intercept against short and medium range ballistic missiles and reportedly can detect and track up to 14 inbound missiles at distances as far as 500 km away and then intercept them as close as 16 to 48 kilometers from the missile system. Some experts believe that India would deploy the Arrow system along the line of control separating Kashmir and the India-Pakistan international border to protect population and military centers.⁷⁰ India has also reportedly been in negotiations with Russia since 1995 to acquire either the S-300PMU-1 or S-300V anti-tactical ballistic missile system.⁷¹

In May 2003, an Indian newspaper reported that India had discussed sale of the U.S. Patriot Advanced Capabilities-3 or PAC-3 air and missile defense system with U.S. Deputy Secretary of State Richard Armitage. According to Indian authorities cited, discussions have been underway with the Bush Administration since May 2002 about such a sale, but the U.S. government has not given Raytheon the go-ahead to provide India with pricing, availability, and other information needed to begin the acquisition process.⁷²

Observers offer a variety of implications for Indian missile defense. Some feel that India's deployment of a missile defense system could erode Pakistan's confidence that its F-16s and missiles, if vulnerable to intercept, could continue to provide a credible nuclear deterrent against India.⁷³ Other analysts believe that an Indian ballistic missile defense capability would break the current state of mutual "non-weaponized deterrence"⁷⁴ and lead Pakistan to mount nuclear warheads on deployed missiles which could destabilize the region. Another possibility is that Pakistan may adopt a "use it or lose it" policy whereby Pakistan might employ its nuclear forces early in the conflict to penetrate Indian defenses.⁷⁵ Another possibility is that Pakistan could embark on a program to develop a greater number of missiles and nuclear warheads in order to saturate and overwhelm India's ballistic missile

⁶⁸ John Donnelly, "Congress Warns Bush, Israel on Arrow Exports," *Defense Week*, Volume 24, Number 22, June 2, 2003, p. 1.

⁶⁹ Terminal phase is the portion of a ballistic missiles flight between atmospheric reentry and impact.

⁷⁰ Ramatanu Maitra, "An Arrow to Washington's Heart," *Asia Times Online*, August 20, 2002, available at [http://www.atimes.com/atimes/South_Asia/DH20Df08.html].

⁷¹ Gregory Koblentz, "Viewpoint: Theater Missile Defense and South Asia: A Volatile Mix," *The Nonproliferation Review/Spring-Summer 1997*, p. 55.

⁷² Shishir Gupta, "India Hopes for Patriot Nod," *Indian Express* (Bombay), May 23, 2003.

⁷³ Koblentz, p. 56.

⁷⁴ Both India and Pakistan are believed to have nuclear warheads and bombs separated from their missiles and delivery aircraft, thus providing a degree of security from undetected first use or accidental launch.

⁷⁵ Koblentz, p. 56.

defenses. Some analysts reject these possibilities and claim that Indian missile defense would contribute to regional stability but provide little explanation as to how missile defense would actually achieve this.

The Pakistani Approach to Missile Defense

With the waiver of the Pressler Amendment because of Pakistan's support for the United States in its war on terrorism, the Indian press has reported that Pakistan has initiated negotiations with the United States to purchase a ballistic missile defense system.⁷⁶ It claims that Pakistan is attempting to acquire either the Patriot system or the Hawk, or Nike-Hercules system. The Hawk and Nike-Hercules systems are no longer in active service with the U.S. Army and were designed primarily to shoot down Soviet-era long-range bombers. While both systems are in use around the world with a variety of militaries, it is not known how effective they would be against modern aircraft and ballistic missiles. Some analysts feel that the acquisition of one of these systems could help dissuade Pakistan from further missile development in an attempt to overcome India's ballistic missile defense capabilities. Pakistan reportedly has stated that it would deploy any missile defense systems around nuclear facilities and at sites where missiles are built and stored. Such a deployment might be intended to insure that at least some of Pakistan's nuclear warheads and missiles would survive an Indian strike and be available as a deterrent.

If Pakistan did acquire a ballistic missile defense system from the United States, India might react by producing more missiles and nuclear weapons to offset an enhanced capability by Pakistan to intercept Indian aircraft or missiles, particularly if Pakistan acquired the more modern and capable Patriot system. Another concern could be that Patriot technology provided to Pakistan might be transferred by Pakistan to China, North Korea, or Iran and be used in the development of countermeasures to prevent U.S. intercept of their ballistic missiles.

Key Issues and Options for Congress

Nonproliferation

MTCR-Related Issues. Some experts have expressed concern that India or Pakistan might export their missiles or nuclear technology to other nations, increasing the number of nuclear missile-armed nations thereby increasing the security risk to the United States and other countries. Neither India nor Pakistan (nor China, for that matter) are members of the Missile Technology Control Regime (MTCR),⁷⁷ which was established in 1987 to restrict the proliferation of WMD-capable ballistic missiles, cruise missiles, and unmanned aerial vehicles (UAVs) and their associated technology. The MTCR is not a legally binding treaty or formal

⁷⁶ Information in this paragraph on U.S. anti-missile systems is from "Pak to Acquire Anti-Ballistic Missile from U.S.," *Times of India* (Delhi), May 15, 2003.

⁷⁷ For detailed MTCR information, see [<http://www.mtcr.info/english/index.html>].

agreement, but MTCR members do voluntarily agree to enforce common export control standards.

Many analysts agree that the MTCR has had a positive impact on slowing missile proliferation. Congress may consider the possibility of renewed U.S. efforts to gain Indian and Pakistani accession to the MTCR. Because of the legally non-binding aspect of the MTCR and its requirements for effective national export control, MTCR membership might be a first step in helping to promote other bilateral or regional initiatives to address missile proliferation and security concerns. Critics of this approach might cite both countries' long-standing resistance to enter into what Pakistan's Permanent Minister to the U.N. called in 1997 "a cartel formed by some industrialized countries for the purpose of placing controls on the transfer of technology" and "an arrangement for promoting their own security interests only."⁷⁸

Technical Assistance. Various technologies might reduce the risk of an India-Pakistan nuclear exchange. Technical assistance for both countries could take a number of forms. A version of a Nunn-Lugar-type program has been discussed in Congress and some analysts see India and Pakistan as prime candidates for such a program.⁷⁹ Other initiatives such as establishing a missile launch notification agreement or hotline might be considered. Military sales designed to help each country safeguard its missiles from accidental launch are also a possible option.

Opponents of technical assistance could argue that it would virtually be impossible to extend any form of technical assistance to one nation without arousing suspicion in the other country. What we might consider as safeguarding ballistic missiles from accidental launch could be construed as improving the ability to launch a missile surprise attack by either country. Another consideration is that of equity. Pakistan, with a smaller and less modern military, could argue that it deserves considerably more technical assistance than India—a position that might arouse considerable Indian opposition.

Export Controls. Another option that could be explored is a multilateral initiative to assist India and Pakistan in improving their export control systems, particularly as they pertain to missile technology. Such an initiative could be a "stand alone" effort undertaken to improve the overall quality of each country's system, or it could be in anticipation of eventual MTCR membership. In order for a country to become an MTCR member, it must be approved for membership by all current members and meet stringent export control requirements.

It is not known how receptive India or Pakistan would be to such an initiative. Export controls are essentially a domestic legal matter and U.S. assistance in this area might not be well received or even appreciated, for that matter. In Pakistan's case,

⁷⁸ "Missile Technology Control Regime - Its Destabilizing Impact on South Asia", presented by the Permanent Representative of Pakistan to the U.N. at the U.N. Conference on a "New Agenda for Disarmament and Regional Security," July 23, 1997.

⁷⁹ For a detailed analysis of the potential application of a Nunn-Lugar-type program in India and/or Pakistan see CRS Report RL31589, *Nuclear Threat Reduction Measures for India and Pakistan*, by Sharon Squassoni.

export controls which could limit its missile-related dealings with North Korea and Iran would likely meet considerable resistance from government and military officials.

Confidence-Building Measures. Confidence-building measures, or CBMs, are described as “measures designed to reduce the risk of deliberate or accidental conflict and build trust by demonstrating the ability of the parties to keep promises.”⁸⁰ Confidence-building measures are by no means new to India and Pakistan. The 1999 Lahore Declaration entailed a number of CBMs designed to “reduce the risks of a nuclear exchange prompted by an accident or misinterpretation of a nuclear or ballistic missile test.”⁸¹ Pakistan’s deployment of troops to Kargil and the ensuing fighting in July 1999 effectively derailed the Lahore process and its associated CBMs.

Some analysts suggest that the United States could play a role in helping to establish a series of CBMs in the region. Experts point to the previously abandoned hotline, notifications of military exercises, and missile launch notifications.⁸² Another possible CBM could be an aerial monitoring effort along the lines of the Open Skies Agreement. If initial joint monitoring flights along the Line of Control proved successful, then deeper, more intrusive flights might be a future option. Other possible measures might involve assisting India and Pakistan in the establishment of a mechanism to settle disputes, perhaps modeled on the U.S. - Russian Nuclear Risk Reduction Centers in Moscow and Washington, or providing technological support in establishing a series of ground-based sensors in critical, disputed areas. Some experts assert that the United States would not necessarily have to be directly involved in all aspects of mediating or monitoring but could provide technological support and advice as needed.

Critics of regional CBMs might emphasize the past failure of CBMs due to the volatile nature of the region. Resurrecting previously-attempted CBMs, only to have them suspended due to a disagreement or incident, could further their argument that the region is not conducive to this particular approach. Perhaps a more practical and cost-effective approach might be to attempt to first settle regional disputes diplomatically and then institute appropriate CBMs on an incremental basis based on equal commitments from both India and Pakistan.

Proliferation Security Initiative (Counterproliferation).⁸³ The Proliferation Security Initiative (PSI), announced by President Bush on May 31, 2003, is an international initiative which focuses on the interdiction of WMD and

⁸⁰ “Building Confidence in India and Pakistan,” *South Asia Program, Center for Strategic and International Studies*, Washington, D.C., August 1, 2002, p. 1.

⁸¹ Howard Diamond, “India, Pakistan Agree on Security, Confidence-Building Measures,” *Arms Control Today*, January/February 1999, p. 1.

⁸² Information on confidence building measures in this paragraph is taken from “Building Confidence in India and Pakistan,” p. 2.

⁸³ Fact Sheet available at <http://www.whitehouse.gov/news/releases/2003/09/print/20030904-11.html>.

associated delivery systems and technology. Ten nations besides the United States have agreed to take steps to stop the flow of these items including the seizure of shipments as they transit air, land, and sea routes.⁸⁴ According to the Administration's Fact Sheet, the PSI principles are "fully consistent with national legal authorities and with relevant international laws and frameworks." The PSI group met in Paris in October 2003 and adopted these principles detailed in the fact sheet. A series of U.S.-sponsored naval interdiction exercises called "Pacific Protector" were conducted in September 2003, involving Australia and Great Britain, as part of the PSI.⁸⁵ While the Administration claims that the PSI does not target any particular country, many experts believe that the PSI was developed in response to growing North Korean missile exports and technological assistance to countries of concern. In theory, both India and Pakistan could be subject to seizures of WMD and missile-related items under the PSI.

Congress may further explore the legality of the PSI both in terms of U.S. and international law. Other issues for Congress may include how the PSI complements or detracts from current nonproliferation regimes. Congress might also review the scope of the PSI in terms of India and Pakistan — will proscribed shipments to or from these countries be interdicted or will we choose not to interdict in order to maintain favorable relations with both countries and their continued cooperation in the global war on terror?

The CRS Report *Weapons of Mass Destruction Counterproliferation: Legal Issues for Ships and Aircraft* questions the legality of the PSI's intent to interdict sea, air, and land shipments. The report acknowledges that international law recognizes that states have a limited right to interdict vessels and aircraft in specific circumstances, but suggests that the PSI's wide-ranging provisions to interdict and seize WMD and missile-related technologies on the high seas appear "doubtful" under current international law. Suggestions to address this issue range from amending current international laws governing the sea and air to include WMD and missile technologies to amending current nonproliferation treaties.⁸⁶

Other Issues

Pakistan-North Korea Relations. Of critical concern to both Congress and the Administration is a suspected Pakistan-North Korean proliferation relationship. Both countries stand accused of proliferating missile and nuclear technology, and many analysts believe that rapid advancements in Pakistan's missile and perhaps nuclear program can be directly attributed to North Korean assistance. Some experts suggest that, as Pakistan's missile programs have matured and advanced, Pakistan

⁸⁴ NPI Participants: Australia, Britain, France, Germany, Italy, Japan, the Netherlands, Poland, Portugal, and Spain.

⁸⁵ "The Proliferation Security Initiative: Naval Interception Bush-Style," *Center for Defense Information*, August 25, 2003.

⁸⁶ For further discussion of legal aspects of the PSI, see CRS Report RL32097, *Weapons of Mass Destruction Counterproliferation: Legal Issues for Ships and Aircraft*, by Jennifer K. Elsea.

may be assisting North Korea in its missile program, primarily by providing North Korea with missile test flight data. Prior to September 22, 2001, when President Bush issued a Presidential Determination waiving a number of sanctions against both India and Pakistan,⁸⁷ sanctions were the primary means by which the United States attempted to compel Pakistan to terminate proliferation activities with North Korea. Today, the situation is considerably more complex and may merit congressional attention.

The BrahMos Cruise Missile. Concerns have been raised about current and proposed U.S. missile defense vulnerability to the alleged supersonic, stealth-enhanced BrahMos cruise missile being developed by Russia and India. Could these missiles in the hands of hostile states and non-state actors, provide them with a dangerous asymmetric military advantage? Another issue is how difficult would it be to develop a nuclear warhead for the BrahMos and what countries presently have the scientific and engineering capability to do so.

Vertical and Non-Missile Proliferation. While U.S. efforts to strengthen the international nonproliferation regime have slowed under the Bush Administration, some observers advocate increasing pressure on India and Pakistan to encourage their accession to such treaties as the NPT and the CTBT. Moreover, the world's nascent nuclear powers watch closely for any new U.S. development and procurement of nuclear weapons, and so U.S. decisions in this realm may have cascading effects on the scope and pace of global proliferation perspectives and behaviors. Thus, while some policy makers believe that new U.S. nuclear weapons would enhance deterrence, others claim that such weapons would undermine U.S. nonproliferation goals. (See CRS Issue Brief IB90091, *Nuclear Nonproliferation Issues*, by Carl Behrens; CRS Report RS20351, *Comprehensive Test Ban Treaty: Pro and Con*, by Jonathan Medalia; and CRS Report RS21619, *Nuclear Weapons and U.S. National Security*, by Amy Woolf.)

Missile Defense

The ramifications of possibly providing U.S.-developed missile and air defense systems to India and Pakistan are of concern. While some experts contend that providing both countries with these systems would help to de-escalate tensions others argue that it could heighten tensions and possibly invite military “adventurism” by creating a false sense of security. In addition to the impact that missile defense might have on India and Pakistan, its possible effects on Sino-Indian relations could be a serious concern.

Were the United States to provide such systems to India and Pakistan, issues related to technology transfer would arise. Policymakers, including many in Congress, would be concerned about the potential for onward transfer of advanced U.S. missile defense technology to countries such as North Korea, Iran, China, and Russia. If these or other countries had access to U.S. missile defense technologies,

⁸⁷ In a Presidential Determination signed on September 22, 2001, President Bush waived sanctions on India and Pakistan and reestablished military sales on selected items.

the potential may exist for them to develop countermeasures and penetration aids that could render U.S. theater missile defenses less effective.

Terrorism

For more than one decade, the United States repeatedly has expressed concerns about ongoing terrorism in Pakistan and neighboring regions, and about the continued existence in Pakistan of outlawed terrorist groups. After September 2001, these concerns became acute. Some Members of Congress, along with numerous independent analysts, have opined that a perceived need for allies in the global anti-terrorist coalition has caused the United States to significantly mute its criticism of South Asian WMD proliferation, and signs of onward proliferation activities by Pakistan, in particular.⁸⁸ It appears that continued U.S. focus on counterterrorism policy requires a trade-off in relation to nonproliferation policy. Options for Congress in addressing this issue include adjustments in U.S. development assistance to improve economic and educational conditions in Pakistan, possibly with regard to reform of the extensive *madrassa* (religious school) system.⁸⁹ A review of military assistance to both India and Pakistan may affect levels of terrorism in the region. In recent years, such assistance has emphasized counterterrorism, including ground transport, airlift, communication, surveillance, and emergency response equipment. Initiatives to help resolve the Kashmir dispute might also reduce the incidence of regional terrorism.

Another facet of U.S. concern in this area regards fears that terrorists in Pakistan or India might gain access to nuclear materials in those countries.⁹⁰ Options for addressing this possibility include authorizing expansion of Cooperative Threat Reduction programs aimed at securing Pakistan's and/or India's nuclear assets, or otherwise seeking to make the region's nuclear arsenals safer through new initiatives, although such initiatives may conflict with U.S. treaty obligations and are opposed by some proliferation analysts (see Technical Assistance section of this report above).

Regional Stability

The United States recognizes that geostrategic and geopolitical stability in South and Southwest Asia are augmented by strong U.S. ties with both India and Pakistan. With New Delhi, the Bush Administration seeks to increase the scope and quality of

⁸⁸ See, for example, the statements of Rep. Eni Faleomaevega and Rep. Gary Ackerman, "Transcript: Hearing of the Subcommittee on Asia and the Pacific of the House International Relations Committee," Federal News Service, March 20, 2003; C. Raja Mohan, "A Paradigm Shift Toward South Asia?," *Washington Quarterly* 26, 1, Winter 2002-2003.

⁸⁹ During a 2003 visit to the United States, Pakistani Foreign Minister Kasuri reportedly requested greater access to U.S. markets as a means of reducing poverty and thus also the forces of extremism in Pakistan. He made a direct link between poverty and the continued existence of madrassas that are implicated in teaching militant anti-American values ("Pakistan: 'A Front-Line Ally' on Terrorism," *Los Angeles Times*, February 2, 2003).

⁹⁰ See Rajesh Basrur and Hasan Askari-Rizvi, "Nuclear Terrorism and South Asia," Cooperative Monitoring Center Occasional Paper 25, Sandia National Laboratories, Albuquerque, N.M., February 2003.

engagement on a range of fronts, including high-technology trade, arms sales, and military-to-military relations.⁹¹ With Islamabad, a somewhat more utilitarian approach focuses on antiterrorism cooperation, even as President Bush vows to establish a multi-year package that would provide billions of dollars in U.S. economic and military aid for the remainder of the current decade.⁹² In both South Asian capitals, the United States is viewed by some as an unreliable ally, so the extent to which Indians and Pakistanis feel assured about long-term U.S. engagement in the region will almost certainly affect their willingness to cooperate on those issues most important to U.S. policy makers.

For these reasons, and others, many in Congress continue to be interested in initiatives that affect the overall tenor of U.S. relations with India and/or Pakistan, as well as the progress of economic development and human rights promotion in the region. Many observers believe that increased U.S. trade with and investment in India and Pakistan would enhance more stable and pacific international relations on the Subcontinent. Some emphasize the need for strong democratic institutions. A major issue may be a more effective U.S. role in efforts to resolve what arguably is the single greatest threat to regional stability: continuing violence in the Kashmir region. From a broader perspective, many experts believe improved U.S.-China and India-China relations could do much to ensure a more tranquil Asia in coming years and decades.

Assessment

In the new century—and especially after September 2001—South Asia is no longer the “strategic backwater” that it was for many U.S. analysts during the Cold War. The overt nuclear postures of India and Pakistan, and U.S.-led antiterrorism efforts centered on Southwest Asia have made the region’s security dynamics a matter of great concern for the United States, where government officials acknowledge that a stable and thriving South Asia would advance U.S. interests. With regard to missile proliferation and South Asian security, many appear sanguine about the future: from the perspective of proliferation optimists, the establishment of nuclear command and control mechanisms and the deployment of reliable ballistic missile capabilities on both sides is seen to contribute to crisis stability through mutual deterrence, and thus to decrease the likelihood of a fourth full-scale India-Pakistan war.

However, proliferation pessimism continues among many. Some years ago, then-Deputy Secretary of State Strobe Talbott warned that, “Unless India and Pakistan exercise genuine restraint and great care, the [nuclear weapons] delivery systems themselves could become a source of tension and could by their nature and

⁹¹ Assistant Secretary of State for South Asia Christina Rocca, “Transcript: Hearing of the Subcommittee on Asia and the Pacific of the House International Relations Committee,” Federal News Service, March 20, 2003; “State’s Rocca Discusses Promoting U.S.-India Cooperation,” U.S. Department of State Washington File, September 11, 2003.

⁹² “Transcript: Bush-Musharraf Talks Focus on Security and Economic Expansion,” U.S. Department of State Washington File, June 24, 2003.

disposition increase the incentive to attack first in a crisis.”⁹³ Unlike aircraft, ballistic missiles cannot be recalled after launch and, given the contiguity of the two countries, missiles afford little time for warning and protective measures. So long as terrorism- and Kashmir-related animosity exists between India and Pakistan, making the outbreak of war a substantive risk, the continued proliferation of strategic arsenals in South Asia cannot be viewed with complacency. Among the future developments that could exacerbate regional tensions are the increased influence of Hindu nationalism in New Delhi and/or the increased influence of Islamic fundamentalism in Islamabad. Moreover, many analysts are concerned that continued military rule in Pakistan will hamper efforts at regional entente.

In the near term, two issues appear key to South Asian security or its absence: (1) ongoing violence in the Kashmir region and Pakistani support for or tolerance of Islamic terrorist groups operating from territory under its control; and (2) Afghan instability and ongoing conflict along the Pakistan-Afghanistan border. Trends in these areas are difficult to determine, but significant violence has continued in both theaters. In the middle and longer term, developments in four areas appear directly relevant: (1) the course of India-China relations and strategic posturing; (2) the extent of positive U.S. engagement with both India and Pakistan; 3) New Delhi's weapons procurement decisions; and 4) the possible deployment of missile defense systems. Here trends appear to be mixed: New Delhi and Beijing have moved toward more peaceful relations, and the United States is remaining fully engaged with both of South Asia's largest countries. Yet India's energetic acquisition of sophisticated new weapons platforms and pursuit of missile defense systems may bode poorly for regional stability. Moreover, within each of these areas, the progress and scope of regional missile proliferation represents a crucial and interactive facet. The importance of U.S. policies toward South Asia is difficult to deny. Missile proliferation and its implications for South Asian security are worthy of careful monitoring in the future.

⁹³ Deputy Secretary [of State] Strobe Talbott, “U.S. Diplomacy in South Asia: A Progress Report,” *U.S. Department of State Dispatch*, December 16, 1998.

Appendix A. Missile Programs

India

Some experts believe that India's ballistic missile program is motivated primarily by a desire for political and technological prestige, and to a lesser extent, strategic military considerations towards Pakistan and China.⁹⁴ India's program is considered to be one of the most ambitious missile programs in the developing world, capable of producing missiles with ranges equal to those deployed by the original five nuclear powers (United States, Russia, China, England, and France). Many analysts consider India's ballistic missile program a derivative of its space program which is rated by some as one of the most advanced programs among emerging missile nations. Some experts claim that India's space launch vehicles constitute an intercontinental ballistic missile (ICBM) capability but others argue that, although conversion of space launch vehicles into ICBMs is possible, India does not have a security requirement that would necessitate such an undertaking.

India launched its first satellite in 1975 atop a Soviet rocket and by 1980 was able to launch a small spacecraft into orbit using its own domestically-produced SLV-3 space launch vehicle.⁹⁵ The Indian Defense Research and Development Organization (DRDO) established the Integrated Guided Missile Development Program in 1983 under the direction of Abdul Kalam to develop ballistic missiles. Most likely in anticipation of the adoption of the Missile Technology Control Regime (MTCR) by a number of key supplier countries, India went on what was described by some analysts as a "shopping spree" for gyroscopes, accelerometers, and motion simulators from suppliers in the United States, Germany, France, and Sweden.⁹⁶ Many analysts cite this foresight in obtaining high quality foreign missile components and subsequent reverse engineering by Indian engineers as a key factor which has enabled India's missile program to become virtually self-sufficient. This self-sufficiency permits India to avoid international export control restrictions as well as inherent difficulties that could arise with extensive foreign involvement in its missile program.

India has developed two ballistic missiles, the short range Prithvi and the medium range Agni.⁹⁷

⁹⁴ Information in this paragraph is from Ben Shepard, "India and Pakistan - A Tale of Two Processes," *Jane's Ballistic Missile Proliferation*, March 2000, p. 11-1.

⁹⁵ Jim Hackett, "The Ballistic Missile Threat: India and Pakistan," *Center for Defense and International Security Studies*, August 1996, p. 1.

⁹⁶ M.V. Ramana and A.H. Nayyar, "India, Pakistan and the Bomb," *Scientific American*, December 16, 2001, p. 3.

⁹⁷ Ballistic missiles are classified by range as follows:

Short Range Ballistic Missiles (SRBMs) = 150 - 799 kms or 93 - 496 miles.

Medium Range Ballistic Missiles (MRBMs) = 800 - 2,399 kms or 497 - 1,490 miles.

Intermediate Range Ballistic Missiles (IRBMs) = 2,400 - 5,499 kms or 1,491 - 3,417 miles.

Table 1. Indian Ballistic Missiles

Missile	Range	Payload	CEP ⁹⁸	Estimated Numbers
Prithvi I	40-150 km	800 kg	50 m	130
Prithvi II	40-250 km	500-750 kg	75 m	70
Prithvi III	40-350 km	500-750 kg	unknown	unknown
Dhanush ⁹⁹	40-250 km	500-750 kg	75 m	70
Agni I	2,500 km	1,000 kg	100 m	5-9
Agni II	3,000-3,500 km	1,000 kg	100 m	1-2
Agni III	5,000 km	unknown	unknown	2

Source: Information in this table is from *Jane's Strategic Weapons Systems*, Issue 37, July 2002, pp. 80-84 and "Agni - India Missile Special Weapons Delivery Systems," Federation of American Scientists, June 19, 2003, available at [<http://www.fas.org/nuke/guide/india/missile/agni.htm>].

Prithvi I. The Prithvi I, like all Prithvi variants, is a single-staged, liquid propellant¹⁰⁰, single warhead short-range ballistic missile. The Prithvi I is used exclusively by the Indian Army and is reported to have high explosive (HE) penetration, submunitions (incendiary and anti-personnel/anti-armor), and fuel air explosive and possibly chemical warheads.¹⁰¹ Following Indian nuclear tests in 1998, some experts believe that India developed a number of small yield nuclear warheads for the Prithvi I with 1, 5, 12 or 20 KT yields with the warhead weight estimated at about 250 kg. First test fired in February 1988, India has conducted 16 known launch tests of the Prithvi series as of March 2003.¹⁰² In service with the army since 1994,

⁹⁷ (...continued)

Intercontinental Range Ballistic Missiles (ICBMs) = 5,500 kms or 3,418 miles and greater.

⁹⁸ CEP is defined as the radius of a circle centered at the target within which 50 % of all missiles aimed at the target would be expected to impact and is the standard for measuring accuracy for missiles and bombs.

⁹⁹ The Dhanush is essentially the Indian Navy's ship-launched version of the Prithvi II and has been under development since 1983. The first test of the Dhanush reportedly resulted in failure 30 seconds after its launch from an Indian offshore patrol vessel anchored in the Bay of Bengal, where the missile was launched from the ship's reinforced, hydraulically-stabilized helicopter deck which had been converted into a launch platform.

¹⁰⁰ Solid propellants are generally favored as they are safer to store and easier and quicker to put into action than liquid propellant-filled missiles. Countries that produce solid propellant missiles are generally considered to have a more technologically-advanced missile program than those countries who produce strictly liquid propellant missiles.

¹⁰¹ Information on the Prithvi I is from *Jane's Strategic Weapons Systems*, p. 84.

¹⁰² Zahid Hussain, "Missile Tests Raise Indo-Pakistan Fears," *Times Online*, March 27, 2003, available at [<http://www.timesonline.co.uk/printFriendly/0,,1-3-624736,00.html>].

the Prithvi I is believed capable of striking approximately a quarter of Pakistan, including Islamabad and other major cities.¹⁰³

Prithvi II. Prithvi II missiles are reportedly used by the Indian Air Force to attack enemy airfields and to support the Indian Army on the battlefield. Some experts believe that efforts are underway to adapt the full range of Prithvi I warheads for Prithvi II use.¹⁰⁴ First test fired in January 1996, the Prithvi II is assessed to be capable of hitting almost half of Pakistan including almost all critical military targets and all major cities.¹⁰⁵

Prithvi III. The Prithvi III is currently under development and is not yet believed to be operational. It is believed to have a range of 350 km and a payload of 750 kg and may also have either a new liquid or solid propulsion system. Some reports suggest that India may install a Global Positioning System (GPS) guidance system that could reduce the missile's CEP to 25 m.

Agni I. The Agni I is a two-staged, intermediate-range, single warhead ballistic missile. The Agni I is believed to have a minimum range of 500 km and a maximum range of 2,500 km with a CEP of 100 m. Some analysts believe that India has developed a 45 KT nuclear warhead for the Agni I and possibly a 200 KT warhead. The Agni I has a separating reentry vehicle (RV) that reportedly has an altitude control system and aerodynamic maneuver fins designed to make intercept from ballistic missile defenses more difficult. The Agni I, considered a technology demonstrator and not a developed weapons system by the Indian government, has undergone three test flights between 1994 and 2002.

Agni II. The Agni II has two solid propellant stages and some experts believe that it has a minimum range of 500 km and a maximum range of 3,000 to 3,500 km. The Agni II is believed to have a 100 m CEP and a separating 200 KT nuclear warhead weighing approximately 500 kg. The Agni II was first test launched in April 1999. Some analysts suggest that a small number of Agni II missiles (fewer than five) have been operationally available since late 2000 and that the annual production rate since then has been from 15 to 20 missiles. The Agni II's range permits it to strike all of Pakistan and deep into western portions of China.¹⁰⁶

Agni III. The Agni III is believed to have a range of 5,000 km (a range of approximately 4,000 km would be required for a missile to reach Beijing from India)

¹⁰³ "Prithvi - India Missile Special Weapons Delivery Systems," *Federation of American Scientists*, June 19, 2003., available at [<http://www.fas.org/nuke/guide/india/missile/prithvi.htm>].

¹⁰⁴ *Jane's Strategic Weapons Systems*, p. 83.

¹⁰⁵ "Prithvi - India Missile Special Weapons Delivery Systems," available at [<http://www.fas.org/nuke/guide/india/missile/prithvi.htm>].

¹⁰⁶ "Agni - India Missile Special Weapons Delivery Systems, Federation of American Scientists," available at [<http://www.fas.org/nuke/guide/india/missile/agni.htm>].

and is presently assessed to be under development.¹⁰⁷ Senior Indian defense officials reportedly claim that the Agni III is a “China-specific” missile and not intended for use against Pakistan.¹⁰⁸ The Times of India claims that the Agni III will be both rail and road-mobile with a new inertial guidance system and will be able to “deliver a one-tonne warhead beyond the range of combat aircraft.” The Agni III may have three stages and some analysts speculate that the first and second stages may be solid propellant stages and the third stage either liquid or solid propellant.¹⁰⁹ India has claimed that the Agni III would only be used to deliver conventional warheads but with a reported cost of 4.5 to 8 million U.S. dollars per missile, some experts find it difficult to imagine that the cost of such a missile could be justified unless it was used to deliver nuclear weapons.¹¹⁰

Submarine Launched Ballistic Missiles (SLBMs). According to some U.S. intelligence sources, India is developing a submarine launched ballistic missile (SLBM) known as the Sagarika which could be operational sometime after 2010.¹¹¹ India reportedly is seeking a nuclear triad (missiles, aircraft, and sea based) to insure that at least some of the country’s nuclear weapons survive a first strike attack.¹¹² It is unclear if the Sagarika is intended to be deployed on a modified Russian Kilo-class submarine or a Russian Akula-class submarine, which is believed capable of firing only cruise missiles, or India’s Advance Technology Vessel, a nuclear submarine that has been under development with Russian assistance since 1985.¹¹³

Russian Involvement in India’s Missile Program. Reportedly, more than two thirds of India’s military equipment is from Russia or the former Soviet Union and some analysts believe that India will purchase an additional 8 billion U.S. dollars worth of military items from Russia in the decade to come.¹¹⁴ While specifics are not readily available, some analyst suggest that it is a reasonable assumption — although India’s missile program is considered largely self-sufficient — that India will continue to acquire some missile components and other missile-related technology from Russia.

¹⁰⁷ *Jane’s Strategic Weapons Systems*, p. 82.

¹⁰⁸ “India - Agni III Reportedly Developed to Counter China,” *Periscope Daily Defense News*, January 21, 2003.

¹⁰⁹ Rajat Pandit, “Agni III Test Likely by Year End,” *Times of India* (Delhi), January 12, 2003.

¹¹⁰ “Agni - India Missile Special Weapons Delivery Systems,” *Federation of American Scientists*.

¹¹¹ “Ballistic and Cruise Missile Threat,” U.S. Air Force National Air and Space Intelligence Center, Wright-Patterson Air Force Base, Ohio, February 2003, p. 18.

¹¹² “Indian Navy Says Sea-Based Nuke Arsenal Necessary,” *Reuters News*, December 2, 2002.

¹¹³ “India’s Nuclear Forces,” *Bulletin of the Atomic Scientists*, p. 3.

¹¹⁴ “Putin Brings Offer of Nuclear-Tipped Arms Deal to India,” *Independent* (London), December 5, 2002.

BrahMos Cruise Missile. India and Russia reportedly are jointly developing the BrahMos anti-ship cruise missile. The BrahMos, which is not presently assessed to be nuclear-capable, has a reported range of 185 miles, a payload of 440 pounds, and a speed of more than 1,400 miles per hour.¹¹⁵ The BrahMos is significant in that it is considered by many analysts to be a state-of-the-art missile which travels at supersonic speed (it is about 3 times faster than the current U.S. Tomahawk cruise missile) and has been built with stealth technology which, according to some experts, could make it virtually impossible to intercept. Both countries reportedly plan to deploy the BrahMos with their armed forces as well as export the BrahMos to third world countries, possibly to offset U.S. military capabilities. According to Global Security.org, the two-staged BrahMos, which can be fired from air, land, and sea, could be modified to accommodate a small nuclear warhead, adding another operational capability to India's nuclear missile arsenal. While India and Russia have publically stated their intentions to deploy the BrahMos to their respective armed forces by the end of 2003, some military officials believe that they are still several years away from deploying the missile.¹¹⁶

Pakistan

Many analysts consider Pakistan's ballistic missile program to be a response to India's ballistic missiles, its sophisticated air defense system, and India's large and well-equipped armed forces.¹¹⁷ Some experts feel that relatively rapid advances in Pakistan's missile program are a result of competition between Samar Mubarak Mund of the National Development Complex, responsible for solid-fuel missiles and Abdul Qadeer Khan of the Khan Research Laboratories where liquid-fueled missiles are produced. Despite these two competing organizations, Pakistan relies heavily on North Korean, Chinese, and, to a lesser degree, Iranian assistance in its missile program.¹¹⁸

Prior to 1989, Pakistan's missile arsenal was comprised primarily of Hatf I rockets¹¹⁹ and Hatf II missiles with ranges of 80 and 280 km, respectively. India's 1989 launch of its Agni I missile, in conjunction with the U.S. denial of delivery of F-16 aircraft¹²⁰ to Pakistan, is credited by many experts as central events that compelled Islamabad to pursue ballistic missiles as Pakistan's primary means to deliver nuclear weapons. In 1992, Pakistan allegedly received M-11 missiles from

¹¹⁵ Neelesh Misra, "India Test Fires a Missile That Could Hit Pakistani Cities," *Philadelphia Enquirer*, February 13, 2003.

¹¹⁶ Information on the BrahMos deployment is from "PJ-10 BrahMos," GlobalSecurity.org, available at [<http://www.globalsecurity.org/military/world/india/BrahMos.htm>].

¹¹⁷ Information in this section on Pakistan's missile program is taken from "India and Pakistan - A Tale of Two Processes," p. 11-1.

¹¹⁸ Cordesman, pp. 102-105.

¹¹⁹ Rockets differ from missiles in that they do not have guidance systems and are reliant on their launch trajectory in order to strike their intended target.

¹²⁰ F-16s were considered by many analysts as Pakistan's primary nuclear weapons delivery means in the late 1980s - early 1990s.

China which are capable of carrying nuclear warheads to a range of approximately 300 km. Since this acquisition in 1992, much of Pakistan's missile program has been devoted to the development of the Shaheen and Ghauri-series of ballistic missiles.

Table 2. Pakistani Ballistic Missiles

Missile	Range	Payload	CEP	Estimated Numbers
Hatf I	60 - 100 km	100 - 500 kg	unknown	80
Hatf II	280 - 450 km	300 - 500kg	200m	unknown
M-11	300 km	500 kg	600 m	30 - 84
Shaheen I	600 km	750 kg	200 m	5 - 10
Shaheen II	2,500 km	750 kg	350 m	5 - 10
Ghauri I	1,500 km	760 kg	2,500 m	5 - 10
Ghauri II	1,800 - 2,300 km	760 kg	unknown	unknown

Source: Information in this table is from *Jane's Strategic Weapons Systems*, Issue 37, July 2002, pp. 124 -131.

Hatf I. The Hatf I is believed to be a single-stage, solid propellant rocket with a 60 to 80 km range carrying a 500 kg payload or a 350 km range carrying a 100 kg payload.¹²¹ Some analysts speculate that the limited range and payload capacity of these rockets would preclude the use of a nuclear warhead and more likely payloads include high explosives, submunitions, and possibly chemical weapons.¹²² The Hatf I's accuracy is unknown and Pakistan may have as many of 80 of these rockets.¹²³

Hatf II. The Hatf II is a two-stage, solid propellant missile of 280 km range with a 500 kg payload or a 450 km range with a 300 kg payload.¹²⁴ The Hatf II program is believed to have been terminated due to technical problems but some analysts speculate that in addition to high explosive and chemical payloads, that the Hatf II was intended to carry a nuclear warhead.¹²⁵

¹²¹ "Hatf-I - Pakistan Missile Special Weapons Delivery Systems," *Federation of American Scientists*, available at [<http://www.fas.org/nuke/guide/pakistan/missile/hatf-1.htm>].

¹²² *Jane's Strategic Weapons Systems*, p. 124.

¹²³ "The Military Balance 2002-2003," *The International Institute for Strategic Studies*, London, U.K., p. 133.

¹²⁴ "Hatf-II - Pakistan Missile Special Weapons Delivery Systems," *Federation of American Scientists*, June 19, 2003, available at [<http://www.fas.org/nuke/guide/pakistan/missile/hatf-2.htm>].

¹²⁵ *Jane's Strategic Weapons Systems*, p. 125.

M-11. In 1992, China reportedly delivered to Pakistan between 30 and 84 unassembled M-11 missiles with a 300 km range and a 500 kg payload capacity.¹²⁶ The M-11's separating warhead is considered by many experts as a desirable characteristic for nuclear weapons delivery, but limited range precludes its use to strike New Delhi or large population centers lying beyond the Indian Desert.¹²⁷ The M-11 is a road-mobile, solid propellant missile with a 600 m CEP that, in addition to high explosive, sub munition, and chemical warheads, can possibly deliver a variety of nuclear warheads with 2, 10, or 20 KT yields.¹²⁸ It is possible that M-11s may be fitted with GPS technology to increase their accuracy.

Shaheen I. The Shaheen I is a solid propellant, single warhead missile reportedly developed by Dr. Samar Mubarak Mund's National Development Complex. Many analysts consider the Shaheen I a scaled-up version of the Chinese M-11 missile. The Shaheen I has a reported range of 600 km, an accuracy of 200 m, and can carry a 750 kg, 35 KT nuclear warhead or conventional or chemical munitions. Because launch preparations for the solid-fueled, road-mobile Shaheen I are relatively short, the missile reportedly can be launched within 5 to 10 minutes of its arrival at a pre-surveyed launch site. Some analysts speculate that Pakistan may have had from 5 to 10 Shaheen Is available for testing and operational use by the end of 1999 and more may have been produced since then.

Shaheen II. The Shaheen II is a road-mobile, two-stage, solid propellant ballistic missile also developed by Pakistan's National Development Complex. Many analysts speculate that the Shaheen II is based on the Chinese M-18 missile.¹²⁹ The Shaheen II reportedly has a 2,500 km range, a 350 m CEP, and can carry a 750 kg 15 to 35 KT nuclear warhead, as well as high explosives, submunitions, chemical, and fuel-air explosives.¹³⁰ The Shaheen II is also believed to have a separating reentry vehicle and its accuracy may be enhanced through the use of GPS technology. The Shaheen II was first publically displayed in March 2000 and it is not believed to have been flight tested to date. Some experts speculate that Pakistan may have produced from 5 to 10 Shaheen IIs.

Ghauri I. The Ghauri-series of road-mobile, liquid propellant missiles are produced in Pakistan's Khan Research Laboratories.¹³¹ Many analysts believe that the Ghauri I is based on North Korea's No Dong I and II missile. Reports that Iran's

¹²⁶ For a discussion of various reports and interpretations of this event, see CRS Report RL31555, p. 5-6.

¹²⁷ "Hatf-III/Shaheen-I/M-11 - Pakistan Missile Special Weapons Delivery Systems," *Federation of American Scientists*, June 19, 2003, available at [<http://www.fas.org/nuke/guide/pakistan/missile/hatf-3.htm>].

¹²⁸ Discussion of the M-11's nuclear warheads and the Shaheen I is taken from Jane's *Strategic Weapons Systems*, pp. 84-130.

¹²⁹ "Shaheen-II/Hatf-6/Ghaznavi - Pakistan Missile Special Weapons Delivery Systems," *Federation of American Scientists*, available at [<http://www.fas.org/nuke/guide/pakistan/missile/shaheen-2.htm>].

¹³⁰ Information on the Shaheen II is from *Jane's Strategic Weapons Systems*, p. 131.

¹³¹ *India and Pakistan - A Tale of Two Processes*, p. 11-3.

Shahab III missile appears to be very similar in design to the Ghauri I have led to widespread speculation by intelligence officials that Pakistan, North Korea, and Iran have collaborated in the development of these missiles.¹³² The Ghauri I is believed to have a range of 1,500 km, and accuracy of 2,500 m, and could deliver a 760 kg 15 to 35 KT nuclear warhead which Pakistan has alleged to have tested in May 1998. The Ghauri I is believed to have been operationally deployed in late 1998 by Pakistan's 47th Artillery Brigade with 5-10 missiles available for testing or operational use.

Ghauri II. The Ghauri II is believed to be a lengthened and improved version of the Ghauri I, possibly employing new propellants and a motor assembly. The Ghauri II's accuracy is unknown but its range is believed to be between 1,800 to 2,300 km and could also accommodate a 15 to 35 KT nuclear warhead as well as the full range of warheads available for the Ghauri I. A Ghauri III missile has been reported to be in development with a possible 3,000 km range and motor tests for this missile were believed to have taken place in July and September 1999.

Foreign Involvement in Pakistan's Missile Program. A February 2000 report from the Central Intelligence Agency cited Chinese and North Korean assistance as "critical for Islamabad's efforts to produce ballistic missiles."¹³³ Some analysts suggest that China may have been heavily involved in the development of the Shaheen I. A 1999 U.S. intelligence report alleges that China transferred designs for a missile factory to Pakistan and this factory is currently being used to produce Shaheen I missiles.¹³⁴ A July 2000 report from the U.S. intelligence community stated that China had stepped up its shipments of specialty steels, guidance systems, and technical expertise to Pakistan.¹³⁵ Press reports, citing a January 2003 Central Intelligence Agency report to Congress on Weapons Technology, claim that China also assisted Pakistan in developing the Shaheen II and possibly nuclear weapons.¹³⁶

Pakistan is believed to have started development of the Ghauri I in 1993 with North Korean assistance.¹³⁷ Experts believe that the Ghauri I is essentially a North Korean No Dong missile. India's interception in June, 1999 of a ship carrying a large amount of missile technology from North Korea to Pakistan has raised the issue that North Korean missile technology may be able to help Pakistan achieve ranges out to 8,000 km.¹³⁸ There is also evidence that Pakistan is reciprocating and assisting North Korea in its missile program. Pakistan has been accused of providing North Korea

¹³² Discussions on the Ghauri I and II are taken from *Jane's Strategic Weapons Systems*, p. 128.

¹³³ Cordesman, p. 103.

¹³⁴ *Ibid.*

¹³⁵ *Ibid.*

¹³⁶ "CIA Says Chinese Entities Helped Pak in Nuke Weapon Production," *Organisation of Asia-Pacific News Agencies*, January 8, 2003.

¹³⁷ Cordesman, p. 103.

¹³⁸ Information on North Korean involvement is from *India and Pakistan - A Tale of Two Processes*, p. 11-4.

with test data from Ghauri test flights for its use in improving its No Dong missiles despite North Korea's self-imposed 1999 moratorium on long range missile test flights.¹³⁹ Some experts have also suggested that Pakistan is providing valuable solid-fuel propulsion technology from its Chinese-based Shaheen missiles for North Korea's use in the Taepo Dong missile program. In 1993, Pakistani and Iranian specialists were alleged to have traveled to North Korea to observe the launch of a No Dong and three SCUD missiles.¹⁴⁰ Some suggest that Pakistani-Iranian missile cooperation has deteriorated. Amin Tarzi, writing for the Monterey Institute of International Studies in California, claims that the relationship has lessened because of reported anti-Shiite activities in Pakistan and Islamabad's policies towards Afghanistan related to the U.S. war on terror in the region.¹⁴¹

¹³⁹ Cordesman, pp. 102-105.

¹⁴⁰ Joseph S. Bermudez Jr., "DPRK-Pakistan Ghauri Missile Cooperation," *Ballistic Missile Development in the Third World*, May 21, 1998, p. 2.

¹⁴¹ Amin Tarzi, "Iran's Missile Test Sends Mixed Messages," *Center for Nonproliferation Studies Reports - Monterey Institute of International Studies*, August 15, 2000, p. 2.

Figure 1. Map of South Asia

Adapted by CRS from Magellan Geographix. Boundary representations not authoritative.